IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:	Docket No.: 1100550-5012US (Formerly 05500008US)
Jennifer Hoyt LALLI *et al.*	
Serial No.: 10/774,683	Group Art Unit: 1711
Confirmation No.: 7374	
Filed: February 10, 2004	Examiner: Thao T. TRAN

For: **RAPIDLY SELF-ASSEMBLED THIN FILMS AND FUNCTIONAL DECALS**

DECLARATION UNDER 37 C.F.R. § 1.132

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

1. I am the inventor of the above-identified patent application, Serial No. 10/774,683.

2. I am President of Nanoscale Materials, Inc.

3. I have read and am familiar with the Office Action mailed January 25, 2007.

4. I understand that in the Office Action mailed January 25, 2007 ("Office Action") the Examiner has rejected claims 69-88 under 35 U.S.C. § 103(a) as allegedly being unpatentable over U.S. Patent 6,592,945 issued to Suzuki (the "Suzuki '945 patent"). A copy of the Suzuki '945 patent is attached as Exhibit A.

5. The claimed invention is directed to a solution-based assembly method for

fabricating a nanocomposite film having alternating layers of nanoparticles layers and polymer layers where an abrasion resistant coating is formed on the surface of the nanocomposite film. The claimed method of producing a nanocomposite film includes contacting a substrate with at least one nanoparticle species by immersing the substrate in a nanoparticles solution to form a nanoparticles layer, immersing the nanoparticle-layered substrate into a polymer solution to form a polymer layer on the nanoparticle-layered substrate to form a nanocomposite film. Moreover, the surface of the nanocomposite film is contacted with a resin to form an abrasion resistant matrix on the nanocomposite film.

6. The claimed methodology generates a nanocomposite film, having a plurality of alternating layers of a nanoparticle layer and a polymer layer to form a nanocomposite film. The nanocomposite film generated by the methodology of the claimed invention results in an elastomeric film where the integrity, structure, and function of the nanocomposite film are maintained under a deforming force.

7. In contrast to my methodology, the Suzuki '945 patent is directed to producing a nanoparticle dispersed structure that may be used as an optical functional material. More specifically, the Suzuki '945 patent is directed to producing a nanoparticle dispersed structure where the nanoparticles are dispersed in and held in a crosslinked polymer layer. In the method disclosed by the Suzuki '945 patent, the nanoparticles are deposited onto the polymer layer by employing methods such as vacuum vapor deposition, sputtering, CVD or MOCVD. A film produced using the Suzuki method, such as sputter coating, results in a film having very different properties than a film produced by my claimed methodology. Specifically, unlike the claimed method, which results in film where the integrity, structure, and function of the nanocomposite film are maintained under a deforming force, a film produced by the Suzuki method will sprawl and crack when placed under a deforming force.

8. Attached as Exhibit B, is a photograph comparing a film produced by the claimed methodology (Panel I) and a film produced by the Suzuki method (Panel II). The photograph shows images taken at rest under 110x magnification, at rest under 550x magnification, and at 1000% strain under 55x magnification. As can be observed, significant cracking occurs in the sputter coated film produced by the Suzuki method after the first and only deformation. In contrast, no cracking is observed in the film produced by the methodology of the claimed invention.

9. In the Office Action, the Examiner alleges that "it would have been obvious to one of ordinary skill in the art to employ immersion to deposit the metal particles because that [sic] these deposition methods have been conventionally used as a substitute for one another." (Office Action at page 3.) The Examiner's conclusion is not correct. There is no suggestion or motivation to make the proposed modification of my methodology because Suzuki actually teaches away from the proposed modification and the modification would render the Suzuki '945 patent unsatisfactory for its intended purpose.

10. Most notable, Suzuki discloses that the nanoparticles are deposited as a discontinuous layer having grain boundaries between the nanoparticles and not as a continuous layer lacking grain boundaries between the nanoparticles. (*See* Suzuki '945 patent at column 3, lines 57-61 and column 4, lines 19-20.) Suzuki further teaches away from forming a continuous layer of nanoparticles by specifically stating "[T]he nanoparticle layer must not be so thick that the nanoparticles form this continuous layer and the grain boundaries disappear." (*See Id.*, at column 4, lines 14-20.)

11. Contrary to the Examiner's conclusory statement, immersion cannot be employed as a substitute for vacuum vapor deposition, sputter coating, CVD, or MOCVD to deposit the nanoparticles on the resin. If immersion were substituted for one of these methods for nanoparticle deposition, a continuous layer of nanoparticles having no grain boundaries between the nanoparticles would be generated, which the Suzuki '945 patent specifically teaches away from producing. Accordingly, the Suzuki method would be

unsatisfactory for its intended purpose if immersion were employed for nanoparticle deposition because immersion would result in the formation of a continuous layer of nanoparticles, which would compromise the resultant nanoparticle dispersed structure and function.

12. Moreover, in reading the Office Action, the Examiner has rejected claims 69-88 35 U.S.C. § 103(a) as allegedly being unpatentable over U.S. Patent No. 6,624,886 issued to Natan (the "Natan '886 patent"), U.S. Patent No. 6,242,264 issued to Natan (the "Natan '264 patent"), or U.S. Patent No. 6,025,202 issued to Natan (the "Natan '202 patent") in view of Meisenburg U.S. Application Publication No. 20040235997 (the "Meisenburg publication"). A copy of the Natan '886 patent, the Natan '264 patent, the Natan '202 patent, and the Meisenburg publication are attached as Appendix C.

13. I have read and I am familiar with the Natan '886 patent, the Natan '264 patent, the Natan '202 patent, the Meisenburg publication, and the Suzuki '945 patent.

14. In the Office Action, the Examiner alleges that "it would have been obvious to one of ordinary skill in the art, to have employed the nanoparticles modified with a siloxane resin of Meisenberg in the invention of the Natan references, to improve heat and yellowing stability of the nanocomposite film." (Office Action at page 5.) Additionally, the Examiner alleges that "it would have been obvious to one of ordinary skill in the art to use the polysiloxane layers of the Suzuki reference in the invention." (*Id.*)

15. The Examiner's proposed combination of the Natan references with either the Meisenberg publication or the Suzuki '945 patent would render the Natan references (i.e., Natan '886 patent, the Natan '264 patent, the Natan '202 patent) unsatisfactory for their intended purpose.

16. The Natan references are directed to producing a surface-enhanced Raman spectroscopy (SERS)-active surface. The Natan references disclose that the SERS-active surfaces are glass substrates coated with either silver or gold nanoparticles, which provide an increase in the observed Raman scattering by many orders of magnitude. The nanoparticles coated on the substrate surface are capable binding to an analyte of interest. Upon binding of the analyte, the characteristic SERS spectrum of the nanoparticle-coated surface is changed in such a way that the presence of the analyte molecule is indicated and the analyte can be quantitated.

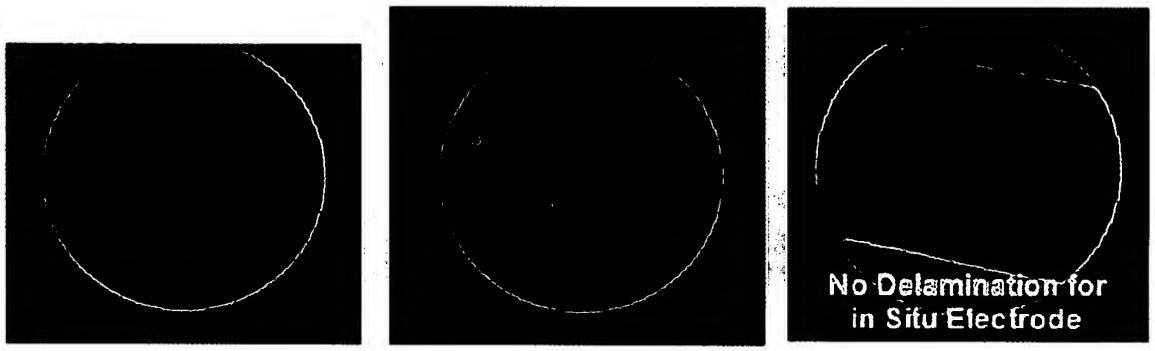
17. If an abrasion resistant coating is formed on the SERS-active surface, the nanoparticles would be inaccessible to the analyte. More specifically, the resin coating would preclude the analyte from binding to the nanoparticles and prevent any SERS quantization of the analyte of interest. Accordingly, the combination of the Natan references in view of the Meisenburg publication or in view of the Suzuki '945 patent proposed by the Examiner would rendered the Natan references unsatisfactory for their intended purpose if a coating were formed on the Natan SERS-active surfaces. The resin coating would prevent analyte binding to the nanoparticles and all sensing capabilities of the SERS-active surface would be destroyed.

18. All statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further, that the statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under section 1001 of Title 18 of the United States Code, and such willful false statements may jeopardize the validity of the application or any patents issuing thereon.

Richard O. Claus

Inventor: Richard O. Claus, Ph.D.

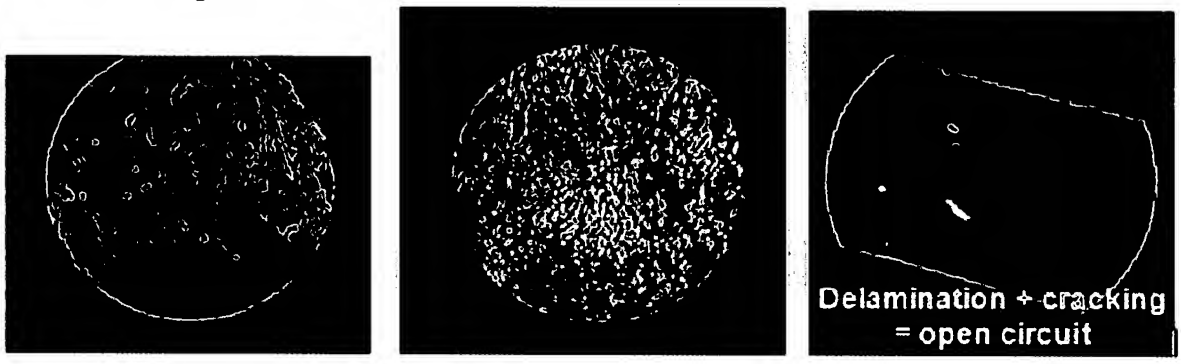
Date 05/23/07



110 x mag at Rest 550 x mag at Rest 550 x mag under 1000% Σ

Panel I (Film produced by Claimed Methodology)

110 x mag at Rest 550 x mag at Rest 550 x mag under 1000% Σ



Panel II (Film produced by Suzuki sputter coating method)